

EA205

SAP BusinessObjects Business Intelligence 4 Sizing – What You Need to Know

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Public

The SAP logo is located in the bottom left corner of the slide. It consists of the letters 'SAP' in a bold, white, sans-serif font, set against a blue rectangular background.

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Your Mileage Will Vary...

We can't cover everything in 60 minutes:

- Today will cover some topics to help illustrate specific concepts
- Sizing advice in a session is akin to prescription instructions from TV

Nothing is a substitute for a proper expert sizing exercise

- Your usage scenarios will dictate how to best consider your deployment
- Your specific environment has everything to do with how you would architect

There is no “Right” answer... But there are wrong ones...

This session focuses on highlighting key sizing and deployment issues:

- How you apply this to your environment is up to you
- Deployment is hard to get “not wrong” and everyone needs help – it’s okay!

What you'll learn in this session....

Next Generation BI: BOE 3.x vs. BI 4

- How and why BI 4 is different from BOE 3.x (and why it affects sizing)

Configuration Intelligence

- Introduced in BI4.1

Sizing your SAP BI 4 system:

- New Sizing Methodology
- Updated BI4 Sizing Guide, Resource Usage Estimator

Demos

- Sizing walkthrough
- P&R Tips



VS

SAP BusinessObjects BI4

SAP BI 4.x is not a technical upgrade from BOE 3.1 or XI R2

BI4 is all 64-bit:

- BOE 3.1 was designed to squeeze the whole suite within a 32-bit architecture
- BI4 is designed to take advantage of modern hardware and RAM (64-bit addressing)

BI4 is architecturally different than 3.1:

- BOE 3.1 was a collection of applications with their own connectivity stacks
- BI4 components share a new common Semantic Layer for data connectivity

BI4 is bigger because it includes new services and applications:

- BI4 is designed for modern infrastructure – don't expect to run on the same hardware
- BI4 is designed as a first-class and highly integrated SAP client for BI
- BI4 has new components – Analysis, new monitoring, native SAP BW connectivity, etc.

2008 vs. 2013

BI changed from its own “suite” to a component of a larger landscape:

- Rapid consolidation of BI players: Business Objects, Cognos, Hyperion
- Increased focus of BI integrating with other “enterprise software” like EPM, BPC, GRC

Hardware and server rooms are fundamentally different today:

- Increased server densities, multiple cores, cheaper RAM, focus on energy, cooling
- “High end” technologies are cheaper, commoditized: SANs, faster networks, etc.

New deployment models:

- Virtualization increases density, reduces hardware costs
- Concurrent Session Based Licensing (CSBL) enables larger BI systems w/o the corresponding increase in licensing costs

New in SAP BI 4.1: P&R Enhancements

SAP's Java VM

- Java 7 Performance

Deployment tuned for better P&R

- Java garbage collection: parallel GC
- Memory settings

Configuration Intelligence

- Templates (S, M, L, XL)
- APS splitting made easy
- Memory configuration
- Much better out-of-box performance
- Professional Sizing still required

New in SAP BI4: Adaptive Processing Service (APS)

Can host a number of services simultaneously:

- Out of box configuration has all services in a single APS instance
- Default install is to get system “up and running” and configurable for your scenarios
 - Configured for “small” systems – Dev, Test, Trial, limited deployments
 - Customers are not expected to go to production without re-configuration

For production, host important services in their own APS:

- Increased throughput, improved scalability, and better response times
- Slightly higher memory consumption due to more JVMs (one per APS)
- Each service has its own memory and processor requirements:
 - Critical to understand role and requirements of **each service** you are deploying

The BI Sizing Guide and BI Platform Installation Guide contain detailed technical information on specific services critical to configure and size correctly

New in SAP BI 4.1: Sizing Updates

Configuration Intelligence

- XL Template saves lots of APS splitting time

Resource Usage Estimator

- aka 'Sizing Estimator'
- Updated June 2013

BI4.1 Sizing Guide

- New Sizing Methodology
- BI4.1 specific tips
- BI4.0 guidance still applies

BI Virtualization

- www.sap.com/bivirtualization

BI4.1 Features for Sizing: Adaptive Processing Server Split

BI4.0 problem:

- After install a single APS is created (with about 30 services).
- Good for a small demo systems, but not good for production.
- Manual APS split workflow is required:
 - Operation is repeated 7 times per machine
 - Need to know which services to select
 - 35 times in 5 machine deployment
 - Error prone
 - Different profiles not considered
 - Need to manually optimize system for resources utilization vs. better performance.

BI4.1 Configuration Intelligence Wizard

The screenshot shows the 'Products' step of the wizard. On the left is a navigation menu with 'Products' selected. The main area is titled 'Products' and contains the instruction: 'Auto-start the servers for these products (applies to all nodes):'. Below this, there is a list of six products, each with a checked checkbox and a help icon: Analysis edition for OLAP, Crystal Reports, Dashboards (Xcelsius), Data Federator, Lifecycle Manager, and Web Intelligence. At the bottom, there are three orange buttons: 'BACK', 'NEXT', and 'CANCEL'.

The screenshot shows the 'Capacity' step of the wizard. On the left is a navigation menu with 'Capacity' selected. The main area is titled 'Capacity' and contains the instruction: 'Use the slider to select a deployment template (for all nodes)'. Below this is a horizontal slider with a green bar that tapers from left to right. The left end is labeled 'XS' and 'Less RAM', and the right end is labeled 'XL' and 'More Capacity'. Below the slider, there are two input fields: 'RAM Required:' with a dropdown menu set to '6 - 8 GB' and 'Number of Adaptive Processing Servers:' with a dropdown menu set to '1'. Below these fields is a note: 'Selecting a deployment template does not replace sizing. Ensure that sizing is performed.' At the bottom, there are three orange buttons: 'BACK', 'NEXT', and 'CANCEL'.

A large container ship is shown from a side-on perspective, sailing on a blue sea under a clear sky. The ship's deck is covered with a dense stack of multi-colored shipping containers in shades of red, yellow, blue, and green. The ship's superstructure, including the bridge and masts, is visible on the left side. The water in the foreground shows ripples and reflections of the ship and sky.

Sizing BI Systems

Where to find SAP BI 4 sizing resources?

<http://sap.com/bisizing>

Challenges in accurately estimating BI4 workloads

Underestimating the complexity of Enterprise software

- You need to be an IT professional to install Enterprise software – BI 4 is no different

Not following SAP's Sizing resources:

- Start with the BI4 Sizing Guide. BI4 Resource Usage Estimator is a tool to help sizing.
- **Use the “BI4 Resource Usage Estimator”**, not the “Quick Sizer” or a pre-BI 4.x sizer
- Sizing Guide, Resource Usage Estimator, Sizing Consultant and Validation are **ALL** required

Underestimating the values within the estimator

- Need to modify numbers you scale out (i.e. adding a WebI server will change numbers)
- Understand the parameters – if the inputs are wrong, the estimate will be invalid
- Plan for headroom to handle peaks in demand – don't run at 80-100% all the time
- Plan for success – expect users to use the system more than you think

Role of external systems to deployment

Poorly provisioned databases will have an invisible effect:

- CMS DB latencies have a cascading effect – one BI admin can't see!
- Ensure that each reporting database and its I/O paths are large enough

I/O bottlenecks – disk and network – have severe effects:

- Worst thing you can do to an I/O intensive application is to starve it for data
- Being on an underperforming file server can starve the entire BI system

Patch your SAP BW systems – incremental performance gains can be big:

- Many poorly performing WebI instances can be traced back to a lack of BW patches
- Tuning expert needed for your BI usage

Ensure virtualization hosts can handle aggregate requirements:

- Putting 5 processing server VMs on one host means the host must have at least 5x the IO capability and 5x the RAM!

BI4 Sizing Guide

Where do you find the SAP BI4 Sizing Resources?

- <http://sap.com/bisizing>



“THE” document you must understand and follow:

- Provides a clear easy-to-follow sizing methodology
- Guidance for all BI services, data sources
- Intended to help you size **your** deployment for **your** needs and **your** hardware

How to use the BI4 Sizing Guide and Resource Usage Estimator

- Sizing Methodology walks you through what to do
- Map out your deployment, creating new nodes or increasing numbers as per guide
 - CMS DB is the key to overall performance and scalability of the entire BI Platform
 - Dedicated CMS DB, on its own hardware is recommended to ensure performance

Building Out Your SAP BI Deployment

Methodically build the system out:

- Start w/ small landscape and increase load in 50-200 user steps, add services as needed
 - Immediately jumping to 1,000 users will make root cause analysis impossible
 - Work to ensure CMS DB, all machines, and network are correctly sized, configured, and monitored
- Carefully monitor and analyze performance and resource usage across entire landscape
 - CMS repository DB, WebApp tier, each BOE services and machine to identify bottlenecks
 - See BI4 Sizing Guide and BI4 Admin Guide to get started



Test, collect results, analyze, repeat:

- Modify your deployment architecture as necessary before adding users
- BI4 Sizing Guide has guidance for this too

BI4 Resource Usage Estimator

What's are "SAPS"?

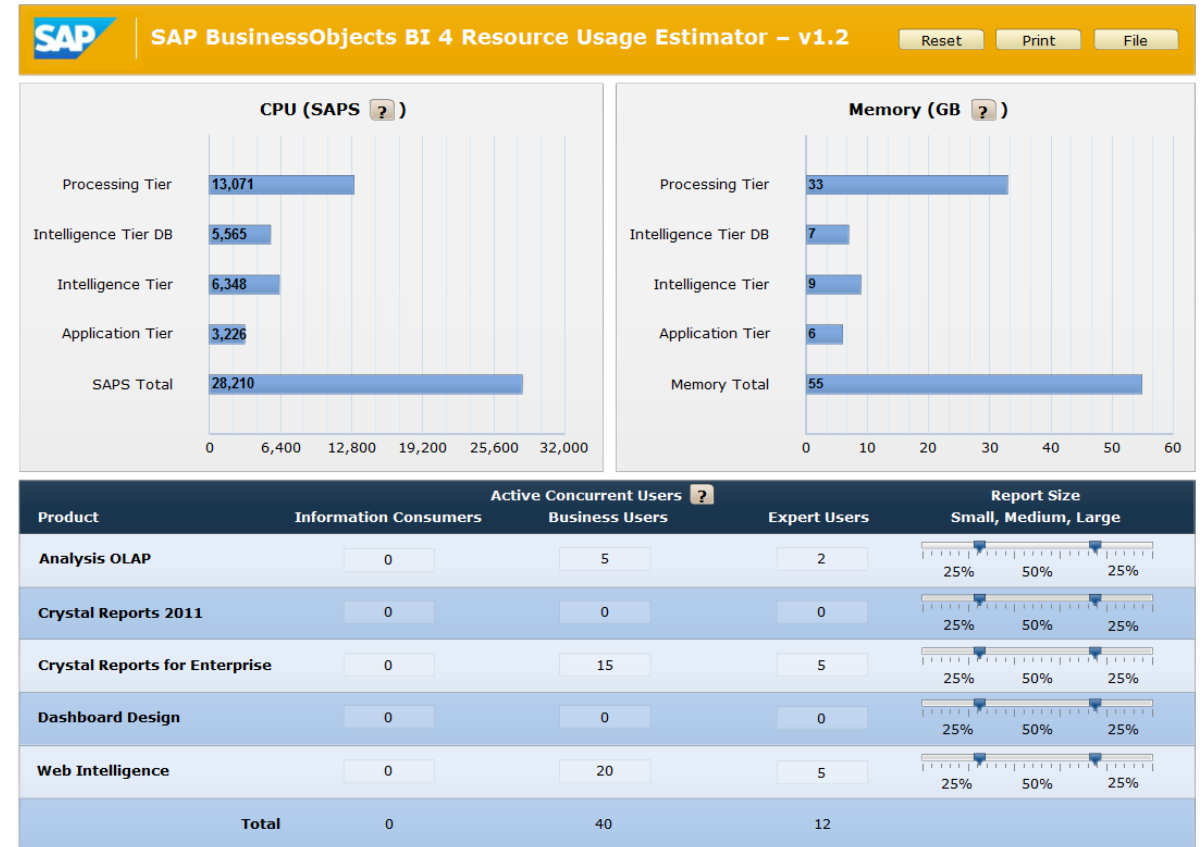
- Hardware-independent measure of performance

Estimator, not analyzer:

- **Starting point only**
- Outputs are NOT numbers you can blindly deploy with
- Not a replacement for expert advice!

Tool limitations:

- Test results were not linear
- One data source for each BI tool
- Assumes deployment to single large machine



Sizing: Estimating users

Active users:

- # of users logged in at the same time (doing something or not)
- If this number is not known, consider 10% of total users:
 - 10,000 users in system x 10% = 1,000 active users

Active Concurrent users:

- # of users generating system load at any one time
- If this number is not known, consider 10% of active users:
 - 1,000 active users x 10% = 100 active concurrent users

Be sure to revisit the 10% ratio:

- Focused BI systems with targeted users can have a significantly higher ratio (i.e. 40%)
- More complicated workflows take more time, increasing % of active concurrent users
- Major reason for most BI systems being under provisioned

Sizing: Report Size

Report size:

- Complexity and datasets are documented in the BI Sizing Guide
- Critical for proper sizing – default of “all medium” should never be used!
- Customers usually underestimate the size of their reports

Different products have different report sizes

- A large Crystal Report is a different size than a large Dashboard
- Look at the BI4 Sizing Guide for specifics

Type of user groups/workflows have different report sizes

- Difficult to estimate the load generated by a user group – all workflows are different
- Customers typically underestimate their user groups
 - i.e. “Information Consumers” typically generate “Business User” loads

Sizing: Users Categories

Information Consumers:

- Typically viewing predefined/static content, very little drilling or filtering on their own

Business Users:

- Moderate amount of drilling and filtering on their own

Expert Users:

- Resource intensive operations including ad-hoc analysis, customization of reports, retrieving large numbers of rows, and heavy client-side filtering
 - Expert users have longer workflows and each step generates more load than any other group

The purpose of these definitions is to give you a general idea – Focus on how hard the user hits the system, not on the think time.

Sizing: Data Sources

Data Source Types Affect Sizing Significantly

- **SQL, OLAP, BW, HANA**
- Data source mix should be known (e.g., 80% SQL Server, 20% BW)

Universe Types

- UNX ('classic'): Migration from XI3.1, WebI
- UNV ('new'): Multilingual Data and Metadata, WebI + Crystal Reports for Enterprise Universe sharing (shared UI, semantic layer, ease of use for CR users, reduced training)

Data Refresh Frequency

- Scheduled Reporting: low frequency → low load
- Fresh Data: high frequency → high load

Sizing Methodology – New!

All New BI4 Sizing Guide released June 2013, Updated August 2013

Updates to Sizing Guide for BI4.1

- August 2013
- Makes use of Configuration Intelligence for APS definitions

New ‘algorithmic’ sizing methodology

- Just like a cooking recipe
- Follow the steps
- Covers more BI data sources, tools and services

Sizing Prerequisite: SAPS Rating

Know your hardware's SAPS rating

- See the SAP SD Standard Application Benchmark Results Web site
- Need to know SAPS per core
- If your hardware doesn't have a benchmark rating, carefully find a best match.
 - I/O processors have a big influence on the SAPS rating
 - Some hardware vendors provide their own SAPS ratings so check there too

<http://www1.sap.com/solutions/benchmark/sd2tier.epx>

Sizing: SD Standard Application Benchmark Results

<u>Date of Certification (mm/dd/yyyy)</u>	<u>Technology Partner</u>	<u>Number of Benchmark Users</u>	<u>Average Dialog Response Time (sec)</u>	<u>Dialog Steps Per Hour</u>	<u>SAPS</u>	<u>Fully Processed Line Items Per Hour</u>	<u>Operating System - Release</u>	<u>RDBMS Release</u>	<u>ERP Release</u>	<u>Server Segmentation</u>	<u>Central Server (*) Additional Specifications</u>	<u>Central Server Memory (MB)</u>	<u>Certification Number</u>
11/11/2011	HP	11445	0.98	3754000	62570	1251330	Windows Server 2008 R2 Enterprise Edition	SQL Server 2008	SAP enhancement package 4 for SAP ERP 6.0		HP ProLiant DL585 G7, 4 Processors / 64 Cores / 64 Threads, AMD Opteron 6282SE, 2.6 Ghz, 64 KB (I) and 16 KB (D) L1 cache per core, 2 MB L2 cache per 2 cores, 16 MB L3 cache per processor	262144	2011046

SAPS per core needed for Sizing

This example: $62,570 \text{ SAPS} \div 64 \text{ cores} = 978 \text{ SAPS per core}$

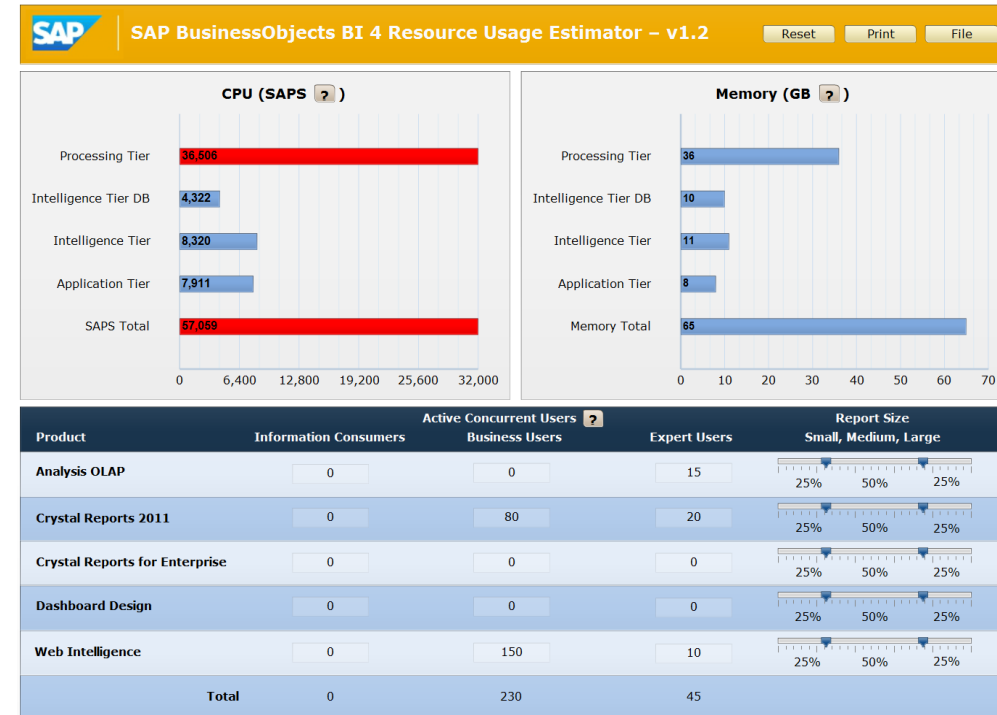
Sizing: Methodology (1 of 4)

Create a Sizing Document/Spreadsheet

Add Resource Usage Estimator SAPS and memory to your document

Steps:

1. Resource Usage Estimator Setup
2. Account for Intelligence DB (CMS) resources
3. Account for Intelligence Tier (CMS) resources
4. Account for Application Tier (Web Server) resources



	A	B	C
1	Sizing		
2		SAPS	Memory
3	Intelligence DB	4322	10
4	Intelligence Tier	8320	11
5	Application Tier	7911	8

Sizing: Methodology (2 of 4)

5. Processing Tier

Each tool accounted for on its own using the Resource Usage Estimator

- a. Account for Analysis OLAP
- b. Crystal Reports 2011/2013
- c. Crystal Reports for Enterprise
 - i. Data Sources: Direct? UNV? BW?
- d. Dashboards
- e. Web Intelligence
 - i. Data Visualization
 - ii. DSL Bridge: used by UNV, BW
 - iii. Data Sources: UNX? UNV? BW?
- f. Lifecycle Management Services



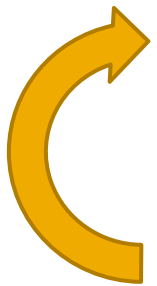
Product	Active Concurrent Users ?		
	Information Consumers	Business Users	Expert Users
Analysis OLAP	0	0	0
Crystal Reports 2011	0	0	0
Crystal Reports for Enterprise	0	0	0
Dashboard Design	0	0	0
Web Intelligence	0	150	10
Total	0	150	10

Sizing: Methodology (3 of 4)

5. Processing Tier (continued)

- g. Platform Search Services
- h. Data Federation Service
- i. Adaptive Connectivity

6. Sizing Analysis and Scale-out



→ For each workload, assign to a machine

- Add 2GB and 2000 SAPS for basic machine operating system
- Add on workload
- Is machine overloaded? Does it have room for more?

	A	B	C	D	E	F	G	H
1	Sizing							
2		SAPS	Memory	Cores		SAPS/core:	2093	
3	Intelligence DB	4322	10	2				
4	Intelligence Tier	8320	11	4				
5	Application Tier	7911	8	4				
6	Analysis OLAP	5528	10	3				
7	Crystal Reports 2011	6509	6	4				
8	Web Intelligence	28469	7	14				
9	DSL Bridge	4186	1	2				
10	Data Visualization (CVOM)		2					
11	LCM	1000	0.75	0.5				
12	Platform Search	1000	0.5	0.5				
13								
14		67245	56.25	33				
15								

Sizing: Methodology (4 of 4)

7. Adaptive Processing Server (APS) Configuration

Leverage BI4.1 Configuration Intelligence XL Template APS definitions

→ XL Template has the most granular APS definitions

Plan APSes to create, disable, remove, group (for redundancy)

8. Deployment and Monitoring

Simulation using Apache JMeter or HP LoadRunner

See the BI4 Admin Guide

Build up the system using simulation to provide load and test.

Start with small loads and increase gradually

Monitor using server metrics, report processing time alerts

Monitoring: Report Processing Time Alerts

Receive alerts when specific reports take too long to run



Monitoring

Run 'Probes' frequently (hourly?) to learn how the system is doing

Learn more about Monitoring in the BI4 Admin Guide

Schedule: Crystal Reports Service (Processing Server)

Hide Navigation

- Properties
- ▶ Default Settings
- ▼ Schedule
 - Instance Title
 - Recurrence**
 - Schedule For
 - History
 - Limits

Recurrence

Run object:

Object will run every N hours and X minutes.

Hour(N) = Minute(X) =

Start Date/Time:

End Date/Time:

Number of retries allowed:

Retry interval in seconds:

How to test a production deployment?

What to be careful of:

- Tests are only as good as the parameters – think time, report size, workflows
- Remember to model the correct user profiles (and in correct proportion!)
- Consider batch versus interactive workflows – use enough of the right type
- Test iteratively and regularly – spot issues before users do – especially when virtualized

Can you use SAP's load testing scripts to run on our own environment?

- No – ours are specific standardized to test P&R and not suitable for customers
- SAP testing workflow is documented in the BI4 Sizing Guide
- Each customer has different scenarios, so unlikely our scripts would work for anybody

How do I know when to scale?

Aim for a 60-65% average CPU utilization:

- That enables peaks to 80-90% w/o setting off data center alerts for high utilization
- Systems peaking at 100% will impact user sessions
- Sounds low? Consider the Sales Department coming back from lunch!

It is important to scale slowly so you know what to add!

- What service in that APS is needing more headroom?
- What's a better use of your resources, another WebI service or an additional MDAS?

CMS-specific:

- CMSes are usually on their own machines – add additional CMS hosts at 65% utilization
- Additional CMSes provide load balancing, fault tolerance, and much needed headroom

There is no “hard and fast rule” for scale out, but common practice of 80% utilization is completely inappropriate for bursty, I/O heavy applications like BI

What about memory?

Be generous with RAM:

- Java allocates memory in “heaps” which can quickly grab large amounts of RAM
- Java garbage collection happens more frequently under memory pressure
- Heavy memory pressure can cause swapping at the OS level

Look at “max” usage, not “average” usage:

- In virtualized scenarios VMware may report low “active memory” and your infrastructure team may overcommit memory (which some consider a best practice)

Make sure your infrastructure team understands how BI is different:

- Most do not understand BI isn't like MS Exchange or a database. BI is bursty!

Business Intelligence is one of the very few applications that does NOT have the performance profile of a “typical enterprise application”

Sizing: Example Scenario

Users (all Active Concurrent):

- Analysis OLAP: 15 Experts
- Crystal Reports 2013: 80 Business Users, 20 Experts
- Web Intelligence: 150 Business Users, 10 Experts

Data Sources:

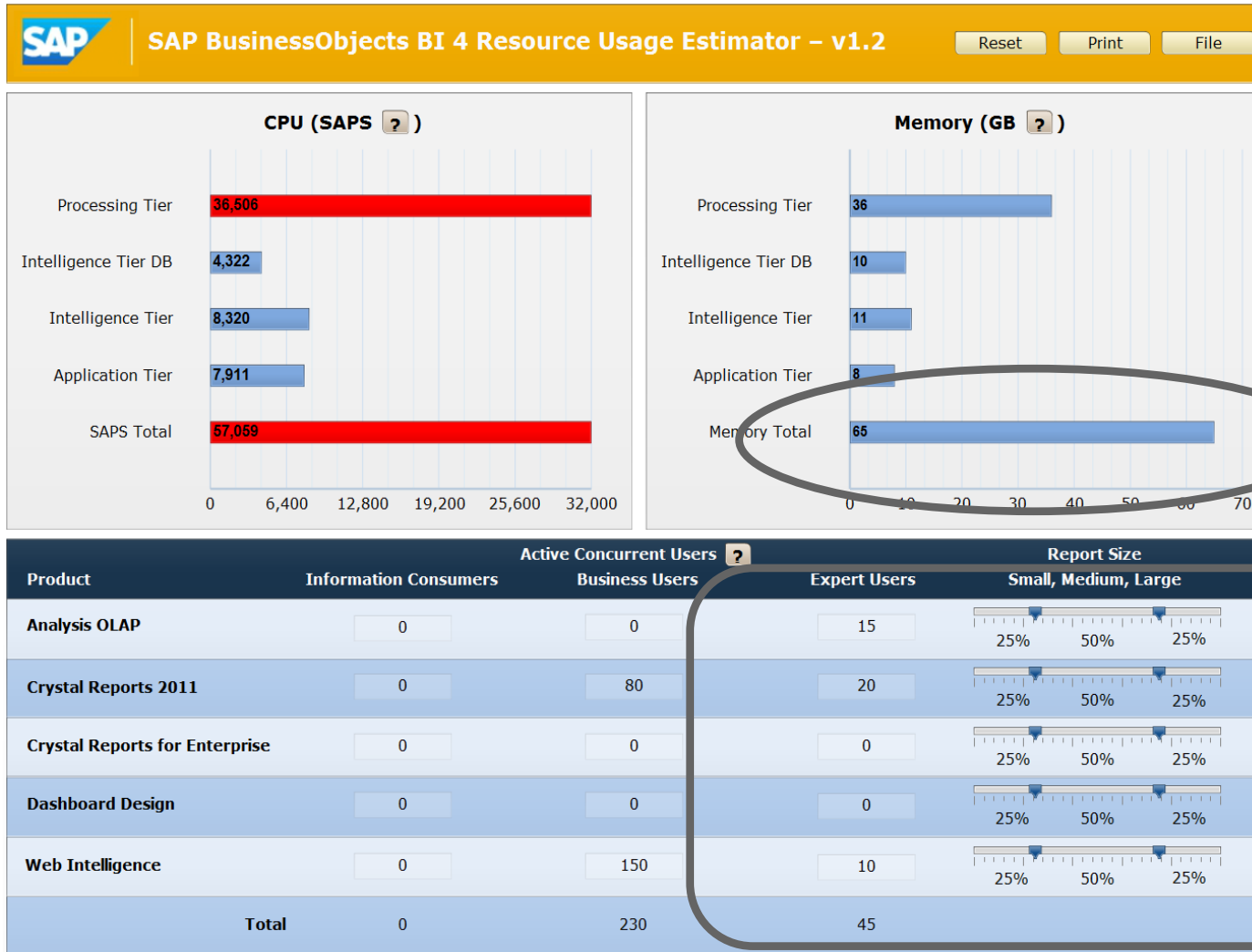
- Analysis OLAP: BW
- WebI: SAP BW. Average query returns 200,000 cells. Peak refresh rate: 40 per minute
- Crystal Reports: relational database

Additional:

- Machines to be used: 25,120 SAPS with 12 cores → $25,120 \div 12 = \mathbf{2093}$ SAPS/core
- Low use of Search
- Departmental usage only → no need for Web tier DMZ, etc.

SAP BI4 Resource Usage Estimator

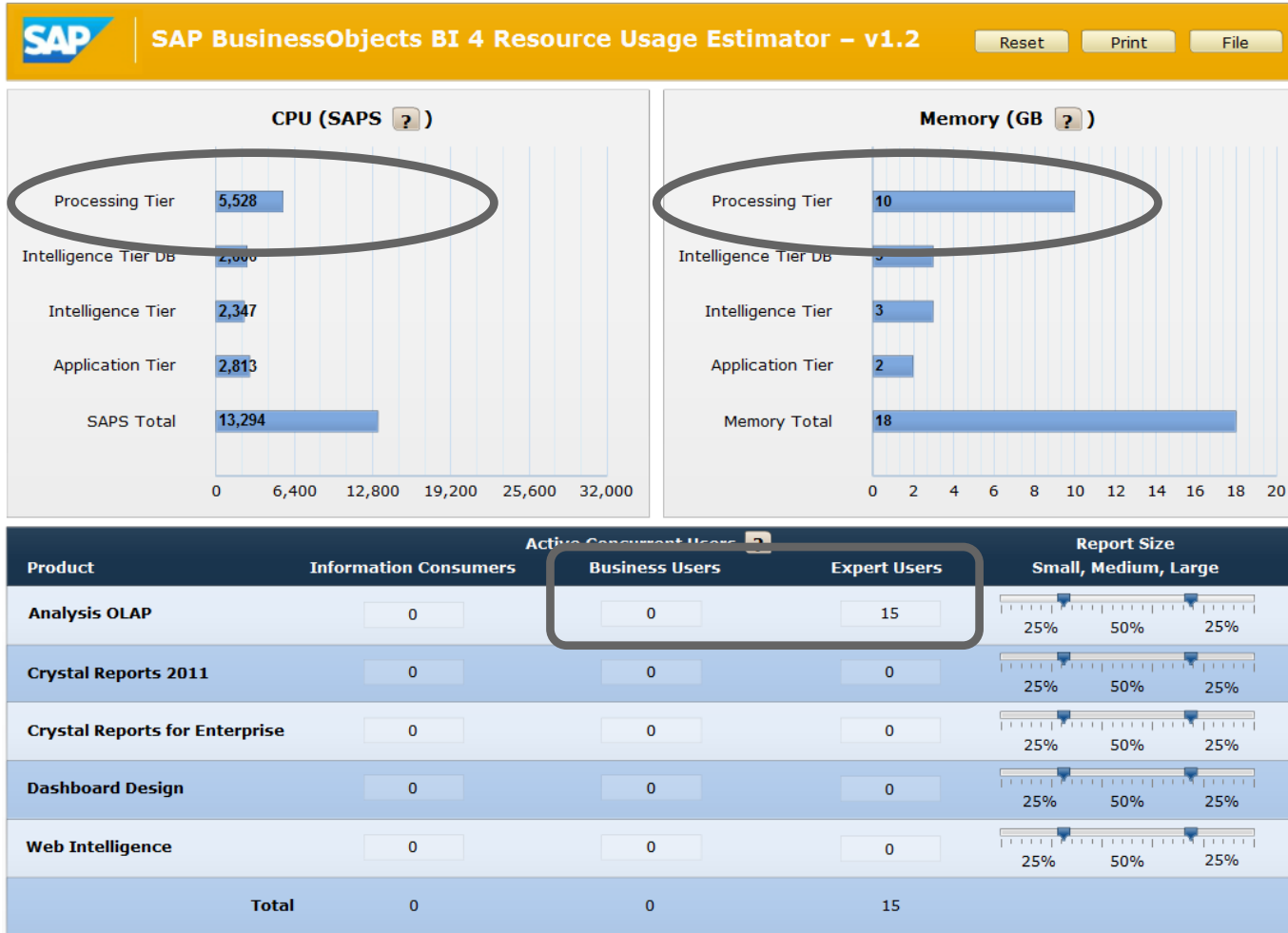
Interpreting the results



Why is this not the total RAM you need?

	A	B	C	D	E
1	Sizing				
2		<u>SAPS</u>	<u>Memory</u>	<u>Cores</u>	
3	Intelligence DB	4322	10		
4	Intelligence Tier	8320	11		
5	Application Tier	7911	8		
6					
7					

Sizing: Analysis OLAP



Analysis OLAP Processing Tier:

- SAPS = 5,528
- RAM = 10 GB

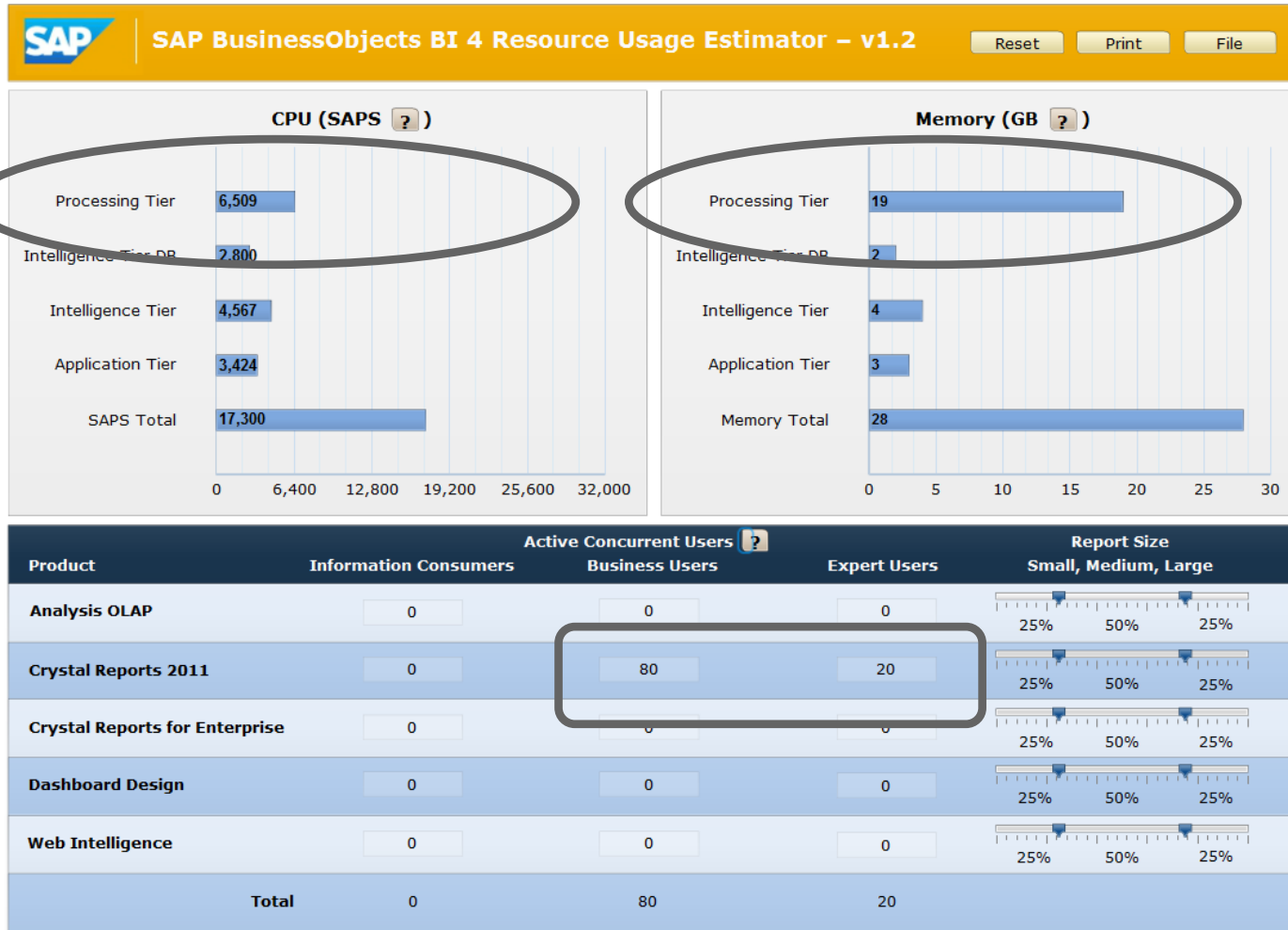
Why are “15” are not like “15 users”?

- Analysis users have lower “think time”

Should you put in more users?

- Pessimism is good
- Think time can be lower than you think

Sizing: Crystal Reports 2011



Crystal Processing 2011 Tier:

- RAM based on # of cores (1.25 x #)
- 8-core machine x 1.25 = 10 GB

Why “10 GB”?

- CR allocates 1.25 GB per core in machine
- Directly related to # of child processes

Why does it show “19 GB”?

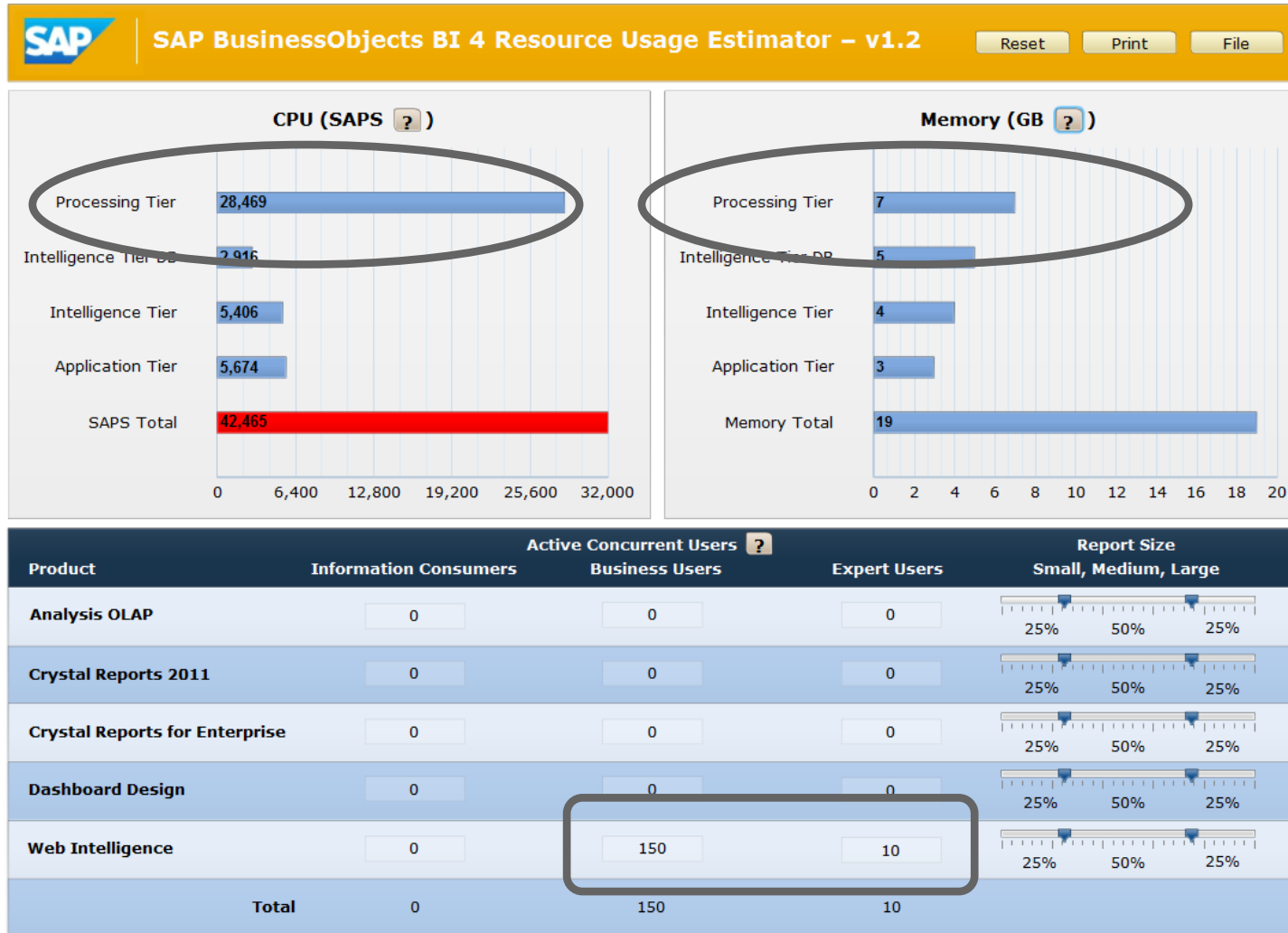
- Based on single machine deployment

How many cores do I need?

- Not yet – stay with SAPS and RAM

Why ignore other tiers here?

Sizing: Web Intelligence (1 of 5)



Web Processing Tier:

- SAPS = 28,469
- RAM = 7 GB

150 Users need only 7 GB RAM????

- Minimum Web process = 6 GB
- Allocate 6GB per instance **revisit

What about SAP BW?

- Requires DSL Bridge (1 per 32 concurrent)
- Min RAM per DSL Bridge is 8 GB RAM

Supporting services

- Data Visualization Services (CVOM) requires 2 GB in APS

Sizing: Web Intelligence (2 of 5): BW data sizing

Benchmark: 1,000,000 cells per query requires 10 seconds processing on a 2000 SAPS CPU

This scenario: 200,000 cells on a ~2000 SAPS CPU

→ 2 seconds of processing

→ Single core capacity: 30 queries per minute

$$\text{cores required} = \frac{\text{required queries per minute}}{\text{queries per core per minute}} = \frac{40 \text{ per minute}}{30 \text{ queries per minute}} = 1.33 \text{ cores}$$

Round up 1.33 to 2 cores to ensure adequate headroom

$$2093 \text{ SAPS/core} * 2 \text{ cores} = \mathbf{4186 \text{ SAPS}}$$

Sizing: Web Intelligence (3 of 5): BW data sizing

DSL Bridge memory required for BW data processing:
 $200,000 \text{ cells} \times 1\text{k/cell} = 200 \text{ MB/core} \rightarrow \mathbf{400 \text{ MB}}$

DSL Bridge memory required to support 160 users:
 $160 \text{ users} \times 0.25 \text{ GB/user} = \mathbf{40 \text{ GB}}$

Total memory for WebI in this scenario **40.4 GB**

Total Processing Power for WebI in this scenario:
 $28,469 \text{ SAPS} + 4186 \text{ SAPS} = \mathbf{32,655 \text{ SAPS}}$

Sizing: Web Intelligence (4 of 5)

Scale Out Required: 32,655 SAPS > 25,120 SAPS per machine

Try spreading it over two machines...

$$32,655 \text{ SAPS} \div 2 = 16,327 \text{ SAPS}$$

$$16,327 \text{ SAPS} + 2000 \text{ SAPS} = 18,327 < 25,120$$

2000 is the basic operating system processing amount

➔ WebI should fit on **two** machines in this scenario

Each machine base requirements:

2 GB, 2000 SAPS for the operating system, BOE SIA, basic infrastructure

Sizing: Web Intelligence (5 of 5): Final Resource Accounting

Resources required for each WebI machine in this scenario:

Memory :

2 GB	OS, SIA, base services	
200 MB	BW data processing (400MB ÷ 2)	→ Allocate to DSL Bridge APS
20 GB	Per-user query caching (40 GB ÷ 2)	→ Allocate to DSL Bridge APS
6 GB	WebI Processing Server	

Total memory for each machine: 28.2 GB

Processing required by each machine:

18,327 SAPS

Sizing: Assign Workloads to Machines (1 of 2)

Machine #1	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Intelligence (CMS) DB	10	4322	2
Intelligence Tier (CMS)	11	8320	4
LCM	0.75	1000	0.5
Application Tier (Tomcat Web Server)	8	7911	4
Total	32	23553	12

Machine #2	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Analysis OLAP	10	5528	3
Crystal Reports 2011	6	6509	4
Platform Search	0.5	1000	0.5
Total	19	15037	9

Initial goal: make the processing fit as logically as possible.

Processing is the constraint. Memory is usually cheaper

Sizing: Assign Workloads to Machines (2 of 2)

Machine #3	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Web Processing Server	6	16327	8
DSL Bridge	20.2		
Data Visualization	1		
Total	30	18327	9

Machine #4	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Web Processing Server	6	16327	8
DSL Bridge	20.2		
Data Visualization	1		
Total	30	18327	9

Sizing: Architecture Review

Sanity Check – Does the resulting architecture make sense?

- Theoretical designs need real-world thinking – why there is no “easy” button
- Consider RAM, CPU, Network I/O, and Disk I/O

Intelligence/Application Machine:

- 23,553 SAPS is **very** close to max 25,120 – what about overhead? Growth?
- Will the workloads compete for resources? Network I/O?
- Maybe you need to split up the machine

I/O:

- Why would you not want to put anything else on the Intelligence DB Tier?
- What are the downsides of putting the CMS and App Tier on the same machine?

This could easily be (and probably should be) a five machine deployment even though the number suggest a four machine deployment – Plan for success

Sizing: Scale out Machine #1

Machine #1a	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Intelligence (CMS) DB	10	4322	2
Intelligence Tier (CMS)	11	8320	4
Total	21	14642	7

Machine #1b	Memory (GB)	SAPS	Cores
OS and BI core	2	2000	1
Application Tier (Tomcat Web Server)	8	7911	4
LCM	0.75	1000	0.5
Total	11	10911	7

Much better distribution of I/O and processing. Much better able to handle bursts in load.

Goal: Aim for **65%** usage.

Room to grow: add on Mobile, add on additional users, etc.

Key learning points

The Larger the deployment, the larger the Sizing Exercise:

- More active concurrent users requires more detailed analysis (especially 1000+)
- More time is needed to simulate and validate the system deployment

Well designed systems require planning, iteration, and scale out:

- Estimates are just that – develop a plan that can be iterated and changed if necessary
- “Big Bang” deployments rarely work – impossible to observe bottlenecks this way
- Plan to grow and scale from the beginning – do not size for “today”

Architecting for virtual (and Cloud) environments:

- **ALL** design principles for physical are valid in virtual and Cloud environments
- Ensure IT understands that BI’s characteristics are very different than other apps

Properly sizing and architecting your system from the start is the single biggest thing you can do to ensure a highly stable and performing BI system over its lifetime

Next Steps: Enterprise Deployment

Sizing the Data Sources

- Are your data sources ready for the added usage?
- Are your data sources tuned for BI?

Enterprise Deployment

- Load Balancing
- Reverse Proxy
- DMZ
- Virtualization see: www.sap.com/bivirtualization

Redundancy

- Fail over
- Avoid single points of failure!



P&R Tips & Tricks

Tip 1: BI 4.0: Using the Java Parallel Garbage Collector

Java provides a garbage-collected environment

→ As portions of memory inside a process are no longer being used, the Java environment will collect it and make it available for new tasks.



Java Garbage Collection

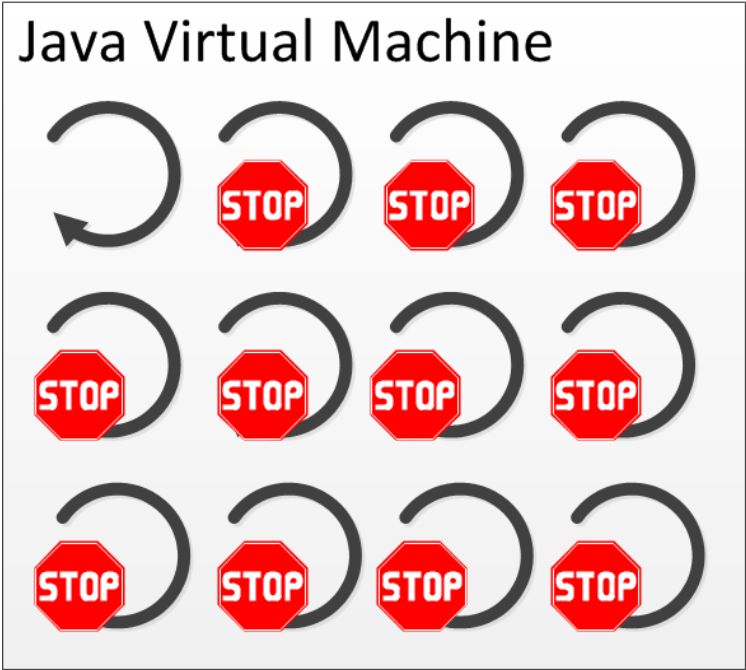
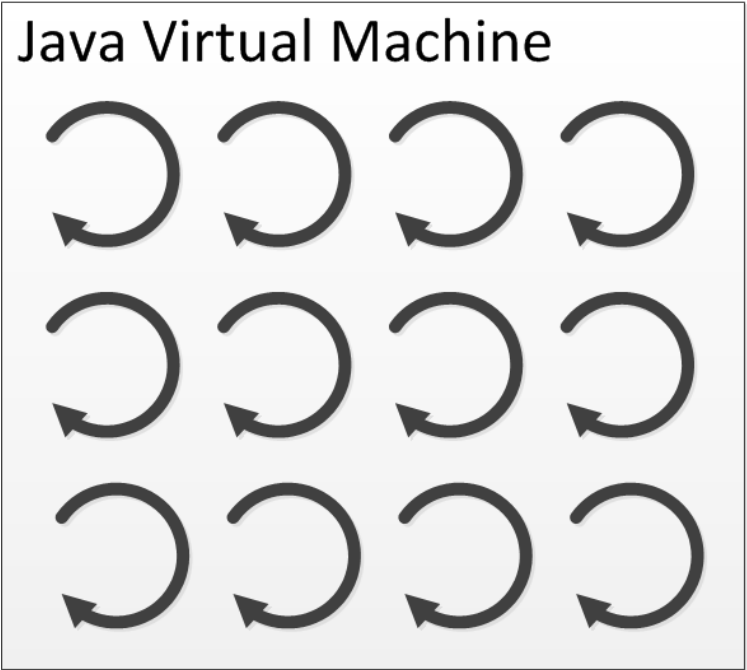
Default Garbage Collector is Single Threaded

Multi-core machines can do a lot of processing

→ All cores running Java tasks stop while a single core collects the garbage



Java Garbage Collection



Collecting Garbage



Parallel Garbage Collection

Enable Java's Parallel Garbage Collector

-XX:+UseParallelOldGC

Applies to APSES and Tomcat

DEMO: See video linked from www.sap.com/bisizing

BI4.1 has this turned on by default

Note: 'OldG': Old Generation data



Tip 2: Speed up Web delivery using Apache and WDeploy

- Static content doesn't change: Javascript, CSS style sheets
- It's a burden on the Web tier to deliver it to users
- It's a burden on Web browsers to frequently download this content that doesn't change. Especially true for mobile devices on slow connections



Split Web delivery using Apache and WDeploy

- The “Apache Split” allows the static content to be offloaded from the Web App server and delivered more efficiently.
- Apache delivers the static content requests, tells browser to cache it
 - → Significant speedup for end-users
 - → Significant reduction in load on the network and servers
- Web App Server (Tomcat) only handles service requests



DEMO: Apache Split Benefits



Apache Split Tips

Walkthrough: Improving the User Experience in SAP BI Platform 4.0 with Apache and WDeploy (<http://scn.sap.com/docs/DOC-6191>)

If you don't have Mobile deployed, use the wdeploy option: `-DAPP=BOE`

Apache 2.2 has been tested. Apache 2.4 is available but there are changes. Configuration of cache module is changed.



DEMO 2: Tomcat CPU Usage with no split

The screenshot shows a Windows desktop environment. In the foreground, a task manager window is open, displaying a table of background processes. A red arrow points to the 'Apache Tomcat for BI 4' process, which is using 14.6% CPU and 578.6 MB of memory. The web browser window in the background shows the SAP BI launch pad interface, with the URL 'http://localhost:8080/BOE/BI' and the user 'Administrator' logged in.

Name	CPU	Private
Commons Daemon Service Run...	14.6%	578.6 MB
Apache Tomcat for BI 4		
Commons Daemon Service Run...	0%	167.3 MB
Server Intelligence Agent (WIN...		
ConnectionServer CORBA server	0%	13.5 MB

DEMO 2: Tomcat & Apache CPU Usage with split

The screenshot shows a Windows desktop environment. In the foreground, a Task Manager window is open, displaying a list of background processes. The 'Performance' tab is selected, and the 'Background processes (28)' section is expanded. The following table represents the data shown in the Task Manager window:

Name	CPU	Private
Apache HTTP Server (32 bit)	0%	7.3 MB
Apache HTTP Server (32 bit)	0.3%	5.0 MB
Apache2.2	0%	2.3 MB
Apache HTTP Server Monitor (32 bit)	0%	0.8 MB
Commons Daemon Service Runner	2.1%	516.1 MB
Apache Tomcat for BI 4	0%	169.3 MB
Commons Daemon Service Runner	0%	169.3 MB

Two red arrows point to the 'Apache Tomcat for BI 4' and 'Commons Daemon Service Runner' rows in the Task Manager window. In the background, a web browser window is open, displaying the SAP BI launch pad interface. The browser address bar shows 'http://localhost/BOE/BI'. The SAP logo is visible in the top left corner of the browser window. The interface includes a navigation bar with 'Home' and 'Documents' tabs, and several content panels: 'My Recently Viewed Documents' (No recently viewed documents), '0 unread messages in My Inbox' (No unread messages), 'My Applications' (with various application icons), 'My Recently Run Documents' (No recently run documents), and '10 or more Unread Alerts' (with an alert icon and text 'Enterprise Nodes Watch Caution I...').

DEMO 3: Create a Tomcat Cluster

- Every 500 users requires an additional Tomcat instance

Here's how to create a two-node Tomcat cluster

Remember to set each to 900 threads and 8 GB of RAM !





<http://sap.com/bisizing>

Thanks for attending!



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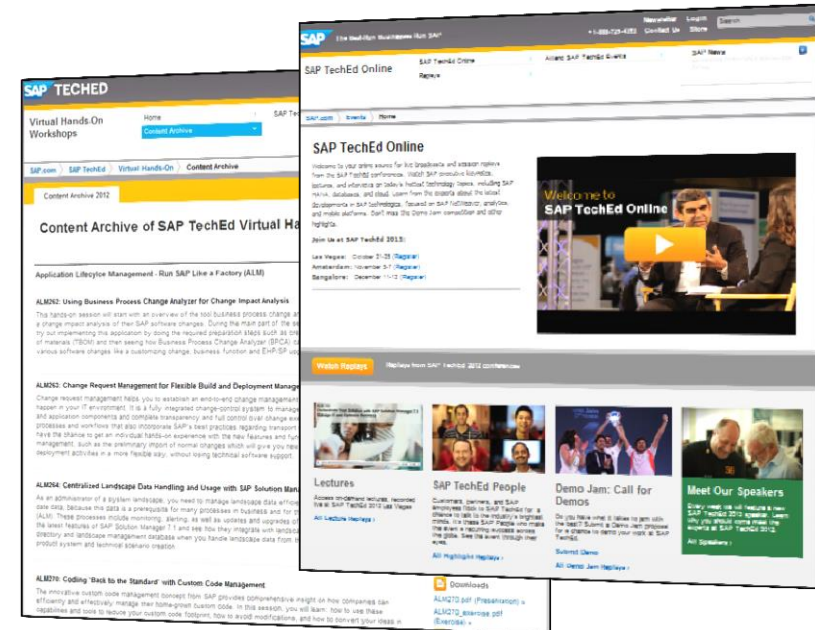
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